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CONTENTS

SNOW-REMOVAL REPORT FOR THE WINTER OF 1927-28

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COMPILED PRINCIPALLY FROM DATA COLLECTED FROM THE 36 STATE HIGHWAY DEPARTMENTS WITHIN THE HEAVY-SNOWFALL AREA

DURING THE WINTER OF 1927-28 SNOW WAS REMOVED FROM 111,645 MILES OF MAIN HIGHWAYS IN THE 36 STATES LYING WITHIN THE AREA OF HEAVY-SNOWFALL, ACCORDING TO REPORTS OF THE AUTHORITIES IN CHARGE OF THE WORK RECEIVED BY THE BUREAU OF PUBLIC ROADS. THE TOTAL COST OF THE SERVICE AS REPORTED, WAS SLIGHTLY IN EXCESS OF FIVE MILLION DOLLARS, AVERAGING APPROXIMATELY $45 A MILE.

REVIEWING THE SNOW-REMOVAL REPORTS OF THE PAST SEVERAL SEASONS IT APPEARS THAT THE INITIAL RAPID EXTENSION OF MILEAGE CLEARED IS AT AN END AND THAT HEREAFTER INCREASE IN MILEAGE WILL BE LIMITED MAINLY TO THE ADDITION OF NEWLY IMPROVED ROADS. AS SHOWN BY TABLE 1, THE MILEAGE OF THE PROGRAM DURING THE PAST SEASON EXCEEDED THAT OF THE PREVIOUS YEAR BY ONLY 4.6 PER CENT, AS COMPARED WITH A GAIN OF 15 PER CENT A YEAR AGO AND INCREASES OF 50 PER CENT OR MORE IN EACH OF THE SEVERAL PREVIOUS YEARS.

THE SAME GENERAL TENDENCY IS TO BE OBSERVED IN RESPECT TO THE TOTAL COST OF THE SNOW-REMOVAL PROGRAM - AN INCREASE OF LESS THAN 9 PER CENT IN THE LAST YEAR AS COMPARED WITH INCREASES OF 24, 106, AND 93 PER CENT RESPECTIVELY IN THE THREE PRECEDING YEARS.

THE AVERAGE COST PER MILE CLEARED DURING 1927-28 WAS ABOUT 4 PER CENT GREATER THAN THE AVERAGE COST OF THE PREVIOUS YEAR, WHICH IN TURN REPRESENTED AN ADVANCE OF NEARLY 8 PER CENT OVER THE COSTS OF THE PRECEDING SEASON. SINCE THE WINTER OF 1925-26, THE EXPENDITURE PER MILE HAS INCREASED ONLY FROM $40.38 TO $45.18. IN THE THREE YEARS PREVIOUS TO THE SEASON OF 1925-26 THE COST PER MILE WAS LESS THAN $30.

AS THERE IS LITTLE DOUBT THAT THE WORK OF REMOVAL HAS BEEN CONDUCTED WITH INCREASING EFFICIENCY EACH YEAR, THE INCREASE IN COST PER MILE PROBABLY REFLECTS A TENDENCY - ONCE THE BENEFITS OF CLEARING HAVE BEEN DEMONSTRATED - MORE AND MORE COMPLETELY TO REMOVE THE SNOW THAT FALLS. UNDOUBTEDLY THE WORK DONE AT AN AVERAGE COST OF $45.18 A MILE IN 1927-28 REPRESENTED A MUCH MORE COMPLETE SERVICE THAN THAT WHICH IN 1922-23 WAS DONE AT A COST OF $28.12 A MILE. IN THIS CONNECTION IT MAY BE OBSERVED THAT THE REPORTS FOR THE PAST SEASON INDICATE THAT THE SNOWFALL IN 22 OF THE 36 STATES WAS UNUSUALLY LIGHT. HAD THE PRECIPITATION IN THESE STATES BEEN HEAVIER THE AVERAGE COST PER MILE FOR THE LAST YEAR WOULD DOUBTLESS HAVE BEEN HIGHER.

Table 1.- Snow-removal mileage and expenditures in the 36 heavy-snowfall States during the five-year period from 1923 to 1928

Winter	Total mileage of roads cleared of snow	Increase over preceding year	Total cost of snow removal	Increase over preceding year	Average cost per mile	Increase over preceding year
	Miles	Per cent		Per cent		Per cent
1922-23	27,096		$ 762,159		$ 28.12	
1923-24	41,302	52	946,262	24	22.91	-18.5
1924-25	62,167	50	1,826,813	93	29.39	28.3
1925-26	93,006	50	3,757,663	106	40.38	37.4
1926-27	106,721	15	4,641,037	24	43.50	7.7
1927-28	111,645	4.6	5,043,779	8.7	45.18	3.9

In the six years since the first snow-removal report was issued there has been a steady improvement in the machines and equipment available for the work and an increasing amount of equipment has been employed in each successive year. The latter fact is indicated by Table 2. Since 1922 the number of truck plows in use has multiplied over 18 fold - from 184 to 3,412. The number of tractor plows has increased in the same period from 281 to 1,275. The fact that the total number of both types of plows - 4,687 in 1927-28 - multiplied more than 11 fold in the six-year period during which the mileage of road cleared increased only about 4 fold is another indication of the greater completeness of removal. The use during the past season of less than half the number of graders employed during the previous year seems to indicate that the grader has been found less effective than the truck and tractor plows.

Trend Toward State Control

In 17 of the 36 States in which snow was cleared from the highways in 1927-28, all work done was under the supervision of the State highway department. In 15 other States work was done by both the State and the counties or other local governments. In some of these States the State highway department cooperated with the local authorities, in others the counties independently cleared certain roads under their jurisdiction and so added to the mileage cleared by the State. In only 4 States in 1927-28 was the work done solely under local control.

In 1922-23, the first year for which reports were received, the work was done exclusively by the State in 11 States, by both the State and the local governments in one State, and exclusively by the local governments in 8 States. Since that year there has been a steady trend toward increased activity by the State and decreased activity by the local governments as indicated by Table 3.

Table 2.- Equipment used in snow-removal operations in the 36 heavy-snowfall States during the six-year period from 1922 to 1928 beginning with the winter of 1922-23

Winter	Number of truck plows	Increase over preceding year	Number of tractor plows	Increase over preceding year	Total number of truck and tractor plows	Increase over preceding year	Miscellaneous equipment		
							Trucks	Tractors	Graders
		Per cent		Per cent		Per cent			
1922-23	184		281		405				
1923-24	1,227	567	287	30	1,514	274			
1924-25	1,456	19	446	55	1,902	26			
1925-26	2,546	75	803	80	3,349	76	3,943	1,348	1,511
1926-27	2,827	11	1,069	33	3,896	16	4,365	1,600	4,272
1927-28	3,412	21	1,275	19	4,687	20	5,239	2,245	2,075

TABLE 3.- CONTROL OF SNOW REMOVAL

WINTER	NUMBER OF STATES		
	CONTROL EXCLUSIVELY BY STATE	CONTROL BY STATE AND LOCAL GOVERNMENTS	CONTROL EXCLUSIVELY BY LOCAL GOVERNMENTS
1922-23	11	1	8
1923-24	21	2	13
1924-25	21	3	12
1925-26	14	16	4
1926-27	10	19	7
1927-28	17	15	4

Snow-Removal Costs

To determine approximately the cost of snow removal, the Bureau of Public Roads has made a brief study during the past year of the expenditures in those States and counties where records were most readily available. The territories selected are fairly representative, and their costs in each case have been reduced to a cost per inch-mile of snow removed.

These figures are not expected to supply a reliable scale with which to estimate the cost of snow removal from rural highways generally, but it is believed that they will suggest within reasonable limits, the probable cost of work of this nature in areas of similar snowfall and temperature and like working conditions.

While the average total depth of snowfall over the entire area during the season is employed in calculating the cost per inch-mile for its removal, it is well known that it is never necessary to remove all the snow that falls. When the temperature is above the freezing point during or after the storm the snow melts rapidly and does not need to be removed. Also it is the practice in most States not to remove snow which falls to depths of less than 2 inches. For these and similar reasons the costs per inch-mile reported hereafter are probably lower than the true costs of the work actually performed.

However, it will be observed that the costs reported in many instances include capital investments which rightly should be charged to the work of several years, but which, because of the inadequacy of accounting methods employed, it is not possible so to distribute with sufficient accuracy to warrant the attempt. The inclusion of these items would tend to increase the cost.

For these and other reasons the costs which are presented hereafter should be regarded as rough approximations. So regarded, it is believed that they will be found useful until such time as more accurate analyses may be possible.

Methods and Costs of Snow Removal in Iowa.

Iowa is divided into 9 engineering districts. Snow removal from the State highways is directed by the maintenance engineer of the State highway department through the various district engineers. These engineers usually appoint assistant district engineers to take charge of snow removal and other maintenance work, and these assistant engineers in turn subdivide the districts into maintenance sections, consisting of from one to three counties, which are placed in charge of maintenance superintendents. Numerous counties remove snow from country roads, but this report covers State work only.

Table 4 shows the snowfall, temperature, cost of snow removal per inch-mile of road, equipment used, and other data for the entire State of Iowa, segregated by districts. District No. 5 is located in the southeastern part of the State where the weather and other conditions prevailing during the past winter contributed towards reducing the cost of the removal work to a minimum. Because of the unusually low total cost of the work, the data were not considered representative and the average per inch-mile was not computed.

The mileage under the caption "Road cleared" includes the roads in each district where snow removal may be required, but certain sections may be so located topographically as to make little if any clearing work necessary during the season, while other sections may need strenuous efforts in order to keep them open and passable.

The State reports that 90 per cent of the roads in the various district programs were protected from drifting conditions with snow fence or by other means, where such protection was considered necessary. For districts 1, 2, 3, 4, 7 and 8, it has been estimated that 80 per cent of the work was on initial or patrol clearing, and 20 per cent on widening operations. For district 5, all of the work represents initial clearing, and for districts 6 and 9, 90 per cent was initial and 10 per cent widening work. The total cost items include purchase of equipment; purchase, installation and removal of snow fence, wages paid laborers, foremen, and motor drivers, and the salary of the maintenance superintendent. Of course, to make the cost per inch-mile more reliable and useful, the amounts expended for equipment, snow fence, and for the other items should be shown separately but those data are not available for the past season.

TABLE 4.- SNOW-REMOVAL DATA - SEASON OF 1927-1928 - FOR THE STATE OF IOWA

Division No.	Average snowfall 1927-28	Mean temperature	Road cleared	Width cleared	Total cost	Cost per inch-mile	Equipment: Truck displacement plows	Equipment: Truck rotary plows	Equipment: Tractor displacement plows	Equipment: Tractor rotary plows	Equipment: Trucks	Equipment: Tractors	Equipment: Graders	Equipment: Snow fence
	Inches	Degrees	Miles	Feet										Miles
1	19.9	36.0	865	28	$ 38,510	$2.24	25	-	2	-	46	25	36	60
2	32.9	32.1	750	28	50,474	2.05	24	2	2	3	47	15	22	130
3	20.9	33.5	812	28	32,083	1.89	12	1	4	1	14	22	16	84
4	12.0	37.7	697	28	12,412	1.48	12	1	4	1	14	22	16	29
5	16.6	39.1	796	28	1,903		9	-	5	-	14	44	18	
6	12.8	36.9	812	28	23,649	2.28	21	-	3	-	23	21	18	36
7	24.6	33.5	822	28	39,315	1.94	15	1	6	-	30	20	23	89
8	32.4	33.2	754	28	64,416	2.64	15	1	8	-	23	26	24	135
9	8.5	38.5	773	28	23,152	3.52	10	-	1	-	20	37	40	35
Totals			7,081		285,914		143	6	35	5	231	232	213	598

NOTE: THE FIGURES FOR AVERAGE SNOWFALL, MEAN TEMPERATURE, AND COST PER INCH-MILE ARE APPROXIMATE.

Methods and Costs of Snow Removal in New York

The State of New York experiences generally considerable snowfall. Its removal from the main highways is accomplished by the counties or townships, and in some instances by both. In Table 5 are given data on the cost per inch-mile for several counties in the western, central, and eastern sections of the State.

Chautauqua County lies along the shore of Lake Erie, and in the extreme southwestern part of the State. Approximately 60 per cent of the work involved consisted of initial or patrol clearing, and 40 per cent of widening operations. About 30 per cent of the total expenditure was for the purchase of equipment; 18 per cent was for the purchase, installation and removal of snow fence; 17 per cent was for wages of labor, foremen, motor drivers and for superintendence; 10 per cent covered depreciation, upkeep or rental of equipment, insurance on labor, etc., and 25 per cent was for such items as gasoline, oil, garage charges, and materials. The superintendent of highways in charge of this county contends that the cost of snow-removal work does not depend so much on the depth of fall as upon the direction and intensity of the wind during the precipitation. Attention is called to the fact that the cost per inch-mile for this county was computed from a total cost about 30 per cent of which was used for the purchase of equipment, and 18 per cent for the purchase and manipulation of snow fence.

The main highways of Cattaraugus county, adjoining Chautauqua county on the east and forming a part of the southern tier of the State, were covered with a total of approximately 55 inches of snow during the past winter. The aggregate cost indicated for the removal work includes the amounts spent for labor, foremen, motor drivers, and superintendents; estimated amounts to cover overhead expense, upkeep of equipment, insurance on labor, and miscellaneous items. Seventy per cent of the work was initial or patrol clearing, and 30 per cent was the widening of preliminary cuts. In addition to the total shown, the county expended $7,900 for the purchase of new equipment and snow fence. The installation and removal of snow fence was accomplished by the townships. It is reported that 50 per cent of the mileage in the program was protected by snow fence.

Table 5.- Snow-removal data - Season of 1927-1928 - for the State of New York

Counties	Average snowfall 1927-28	Mean temperature	Road cleared	Width cleared	Total cost	Cost per inch-mile	Equipment: Truck displacement plows	Equipment: Truck rotary plows	Equipment: Tractor displacement plows	Equipment: Tractor rotary plows	Equipment: Trucks	Equipment: Tractors	Equipment: Snow fence
	Inches	Degrees	Miles	Feet									Miles
Chautauqua	53.2	37.5	161	24	$ 40,500	$4.73	8	1	4	-	9	4	65
Cattaraugus	55.5	38.0	310	18	26,205	1.52	13	-	4	-	17	4	25
Erie	80.7	35.7	400	10	112,542	3.49	60	-	18	1	60	19	32
Niagara	37.5	35.5	125	16	5,537	1.18	6	-	6	-	6	6	8
Onondaga	87.1	36.3	305	22-30	18,182	0.68	23	-	-	2	23	2	11
Warren	85.5	35.2	125	30	15,000	1.40	2	-	7	-	-	-	6
Totals			1,426		$217,966		112	1	39	3	115	35	147

Note: The figures for average snowfall, mean temperature, and cost per inch-mile are approximate.

The total cost of the work in Erie County, surrounding the City of Buffalo, may be separated into the following items: 43.9 per cent for the purchase of equipment and snow fence; 34 per cent for the installation and removal of snow fence, wages of labor, foremen, and motor drivers, and salary of superintendents; 22.1 per cent for the insurance of labor and for miscellaneous expenses. It is believed that the high cost per inch-mile is accounted for largely by the fact that approximately 66 per cent of the total cost was expended on purchase of equipment, insurance of labor, etc. Another factor that should be considered is that this county includes hilly terrain which is responsible for considerable drifting.

Niagara, the extreme northwestern county of the State, bounded on the west by the Niagara River, and on the north by Lake Ontario, experienced an average depth of 37.5 inches of snow during the winter of 1927-28, and a mean temperature of 35.5 degrees. The data in Table 5 show that $5,537 was expended on snow removal work for the entire season. Forty-seven per cent of that sum was used for the installation and removal of snow fence and the remainder for the wages of labor, foremen and motor drivers, the salary of superintendents, estimated amounts for overhead, equipment depreciation, upkeep, or rental, insurance of labor, and other miscellaneous items. Widening work was accomplished but these costs were not segregated from the other work. All roads were protected from drifting where such protection was necessary.

Onondaga County, which includes the City of Syracuse, is well organized for the removal of snow from its rural roads. With regard to the data shown in Table 5, 75 per cent of the roads on the program were protected from drifting; 30 per cent of the work represented initial or patrol clearing; and 70 per cent widening activities. The total funds expended cover the following items: $5,326 for the rental and repair of equipment, and also for depreciation, carrying charges and interest on the investment; $1,824 for the manipulation of the 8 miles of snow fence handled by the county; $7,367 as wages of labor, foremen, and motor drivers; and $3,665 for supplies and other expenses.

Warren County is situated within rather a mountainous territory lying on the shore of Lake George and east and south of the Adirondack State Park. The total cost shown in Table 5 for the snow-removal work includes percentages paid for the installation and removal of snow fence; wages of labor, foremen, and motor drivers, and salaries of superintendents; but excludes expenditures made for the purchase of equipment or its upkeep, the initial cost of snow fence, and amounts estimated for overhead expense, or miscellaneous items. Six miles of snow fence were provided where drifting conditions were serious, and an ample width of cleared roadway was maintained throughout the winter.

Snow-Removal Methods and Costs in Rhode Island

The State of Rhode Island employs a snow-removal force continuously throughout the winter so as to have personnel always in readiness to operate when the snow has fallen to the required depth. The snow-removal work is in charge of a number of district engineers, with headquarters at Providence, working under a maintenance superintendent who reports to the chief engineer. The equipment when not in use is stored at a central shop or at various division shops scattered over the State. When the falling snow reaches a depth of 2 inches, each foreman notifies his division engineer that he is beginning operations on his section. During a storm each district engineer remains at his home or office until all of his foremen have reported and then goes into the field to supervise the work. When the storm ends and the initial clearing is completed, the foremen telephone to the principal office that the roads in their respective sections are open. Under this method of procedure, the data indicate that snow removal cost the State an average of $4.55 per inch-mile for the season of 1927-28. The mean temperature for the State last winter was about 44 degrees. The average width of the plowed cut, after widening, was 24 feet. Approximately 60 per cent of the cost was expended on initial clearing and 40 per cent on widening. The total cost upon which the cost per inch-mile was based represents expenditures for labor, fuel and oil, but does not include any charge for equipment or its depreciation, overhead, or insurance. About 80 per cent of the cost was for labor and 20 per cent for fuel and oil.

Snow-Removal Methods and Costs in Connecticut

The State of Connecticut is divided into eleven repair districts each in charge of a supervisor of repairs whose duties include the removal of snow under the general direction of the State engineer of maintenance. The State confines its snow-removal work to the State highways. In some instances the towns clear their local roads, but data on such work are not included in Table 6 which gives the information for the State work only. The snow-removal equipment is owned by the State and loaned to the various maintenance districts on a rental basis. Plows and trucks are allotted to each district, but when not needed at these locations are withdrawn and re-allotted to other districts where a heavy snowfall has occurred.

The total cost of the work for the different districts includes wages paid labor, foremen, and motor drivers, equipment depreciation, upkeep and rental, and other miscellaneous items, but omits costs involving the purchase of equipment, the purchase or handling of snow fence, charges for superintendence, or any estimated amounts for overhead expense, or insurance of labor. Both initial and widening work were carried on, but no segregation of cost of these activities was made.

The cost per inch-mile for District No. 7 is high because this district lies in the Berkshire Hills region at the northwestern corner of the State, where heavy drifts are encountered. Furthermore, although it is estimated from the United States Weather Bureau data that an average of 27.6 inches of snow fell over the entire district during the season, the State records show that 63 inches of snow fell in certain sections of the district.

TABLE 6.- SNOW-REMOVAL DATA - SEASON OF 1927-1928 - FOR THE STATE OF CONNECTICUT

District No.	Average Snowfall 1927-28	Mean Temperature	Road Cleared	Width Cleared	Total Cost	Cost per Inch-Mile	Equipment: Truck Displacement Plows	Equipment: Truck Rotary Plows	Equipment: Tractor Displacement Plows	Equipment: Tractor Rotary Plows	Equipment: Trucks	Equipment: Tractors	Equipment: Graders	Equipment: Snow Fence
	Inches	Degrees	Miles	Feet										Miles
1	14.2	39.2	181	26-50	$ 3,062	$1.19	25	-	-	-	17	-	-	-
2	14.9	40.4	192	26-32	4,429	1.55	25	-	-	-	18	-	-	1.5
3	15.0	40.6	163	26-32	6,972	2.85	25	-	-	-	16	-	-	0.8
4	18.7	40.7	149	26-32	3,088	1.11	25	-	-	-	13	1	-	0.1
5	17.9	40.2	185	26-32	6,336	1.91	25	-	-	-	14	-	-	-
6	17.0	39.8	239	26-32	5,703	1.40	25	-	-	-	21	-	-	-
7	27.6	37.7	210	26-32	19.019	3.28	25	-	-	-	32	4	-	8.5
8	20.5	39.8	127	26-32	5,455	2.10	25	-	-	-	19	1	-	-
9	23.5	39.3	177	26-32	4,386	1.05	25	-	-	-	17	-	-	0.8
10	26.0	39.0	150	26-32	4,335	1.11	25	-	-	-	15	-	-	0.6
11	29.6	37.0	178	26-32	8,980	1.70	25	-	-	-	20	1	-	0.2
Totals			1,951		71,765		275	-	-	-	202	7	-	12.5

NOTE: THE FIGURES FOR AVERAGE SNOWFALL, MEAN TEMPERATURE, AND COST PER INCH-MILE ARE APPROXIMATE.

Snow-Removal Methods and Costs in West Virginia

West Virginia reports snow-removal operations for the northern part of the State only. Within this section one of the engineering divisions, located in mountainous territory, kept 271 miles of its roads clear of snow for the season of 1927-28 at an average cost of 45 cents per inch-mile. The mean temperature for the winter was 41.5 degrees, and open roads were maintained at a width of 16 feet. The work was done with 23 truck displacement plows, one rotary plow with a truck mount, and two one-man graders. The average seasonal snowfall over the entire division was 53.2 inches, and $6,440 was the total expenditure for its removal. Twenty-eight per cent of this amount was charged against equipment depreciation; 44 per cent was for the hire of labor, foremen, and motor drivers; 4 per cent for salary of superintendents; 6 per cent estimated for overhead expense; 17 per cent for equipment upkeep, gas, oil, tire repair and garage rent, and 1 per cent for handling snow fence.

Snow-Removal Methods and Costs in Arizona

Arizona submitted snow-removal data for only one engineering division. This division lies in the center of the State between Maricopa County on the south and Grand Canyon National Park on the north. During the winter of 1927-28, the snowfall averaged 24.8 inches and the mean temperature was 46.7 degrees. The sections of road cleared were not continuous but were scattered over the division in areas with variable depths of snowfall. The aggregate length of road cleared equaled 146 miles with an average width of 18 feet. The equipment used consisted of 3 displacement plows mounted on tractors, and 7 graders pulled by motor trucks. Eighty-five per cent of the activities were confined to initial clearing or patrol work and 15 per cent to widening operations. The work cost $2,715, or an average of 75 cents per inch-mile. The sum total was segregated as follows: 33 per cent for hire of labor, foremen, and motor drivers; 47 per cent for equipment depreciation, upkeep or rental; and 20 per cent for gas, oil and grease. Snow fences and other drift-preventive measures were not employed.

Snow-Removal Methods and Costs in Wisconsin

While the snow-removal data for Wisconsin are segregated into the nine engineering divisions of the State Highway Commission, the work is accomplished by the various counties without the financial aid or the active control of the State authorities. Winter maintenance of the main highways is in charge of the respective county highway commissions with funds provided by the counties. In some instances the townships clear their roads, using town funds, but such activities are not included in this report.

As may be seen in Table 7, the roads of all divisions, with the possible exception of those in Division 9, where light snowfall was reported during the past winter, were protected from drifts with generous sections of snow fence. Likewise, with the exception of Division 5 and the other divisions shown blank under the caption "Width cleared", more or less widening work was accomplished. For Division 3, 25 per cent of the total cost was for widening activities; Division 4, 35 per cent; Division 7, 60 per cent; and in Division 8, 26 per cent of the cost covered this class of work.

Divisions 3, 4 and 8 report that their total cost for snow-removal work includes purchase of equipment in the proportions of 25, 30, and 15 per cent respectively. Division 7 reports that their total cost did not include the purchase of equipment and the remaining divisions made no report concerning this item. Division 3 supplied the information that the cost of superintendence is paid from general county funds, and Division 7 states that amounts paid superintendents and estimated charges for overhead are not included in the total cost of snow-removal work; but the other division reports generally indicated that their respective totals included the salary of superintendents. For all the divisions reporting, including 3 and 7, the total cost included, as a rule, amounts for the purchase and handling of snow fence; wages paid labor, foremen, and motor drivers; estimated percentage for overhead expense; equipment depreciation, upkeep, or rental; insurance of labor; and other miscellaneous items.

TABLE 7.- SNOW-REMOVAL DATA - SEASON OF 1927-1928 - FOR THE STATE OF WISCONSIN

Division No.	Average Snowfall 1927-28	Mean Temperature	Road Cleared	Width Cleared	Total Cost	Cost per Inch-Mile	Equipment: Truck Displacement Plows	Equipment: Truck Rotary Plows	Equipment: Tractor Displacement Plows	Equipment: Tractor Rotary Plows	Equipment: Trucks	Equipment: Tractors	Equipment: Graders	Snow Fence
	Inches	Degrees	Miles	Feet										Miles
1	22.9	37.8	2,565	18	$ 19,800	$0.34	21	-	19	1	30	26	42	30
2	32.2	33.3	3,000	-	69,276	0.72	54	-	21	-	54	21	-	90
3	57.5	33.6	*2,100	16	80,000	0.66	32	-	15	1	30	13	-	69
4	47.4	33.7	2,400	22	77,761	0.69	24	-	9	-	24	11	5	48
5	51.9	33.6	1,500	10	45,000	0.58	7	-	2	-	12	12	9	63
6	62.2	30.2	2,146	-	52,485	0.39	16	-	15	-	16	15	-	54
7	81.1	29.2	*1,533	22	80,000	0.64	12	-	15	2	16	21	-	129
8	73.3	28.9	1,826	20	63,676	0.47	14	-	14	-	14	16	3	65
9	27.4	37.8	425	-	5,000	0.43	1	-	2	-	-	-	-	6
Totals			17,495		492,998		181		112	4	196	135	59	554

* INCLUDES COUNTY ROADS OTHER THAN TRUNK HIGHWAYS.

NOTE: THE FIGURES FOR AVERAGE SNOWFALL, MEAN TEMPERATURE, AND COST PER INCH-MILE ARE APPROXIMATE.

Although the cost per inch-mile, as shown by Table 7, varies to some extent in the different districts, the figures are reasonably uniform, when the different local conditions are taken into consideration. The similarity in the figures is also very close in view of the fact that no scientific cost accounting methodswere used.

General Snow-Removal Statistics

The attached table of general statistics shows the kind of mileage cleared and total cost of snow-removal work together with the equipment used during the winter of 1927-28 in the 36 States within the heavy-snowfall area. The data were collected from the State highway departments, with one or two exceptions where the counties furnished the information. It should be borne in mind that the data include the work done by the States and the one or two counties mentioned, on their main highways, but do not include similar work done by the various counties and townships on their local roads, or snow-removal operations carried on by municipalities, transportation companies, public institutions and divers business agencies.

The average cost per mile for snow removal, which has been given in previous years, has been omitted from this table.

The attached map shows the available data with regard to the location of the main roads which were kept open for winter traffic during the snow season of 1927-28. The information for Maine was not received in time to be shown on this map.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS - DIVISION OF CONSTRUCTION

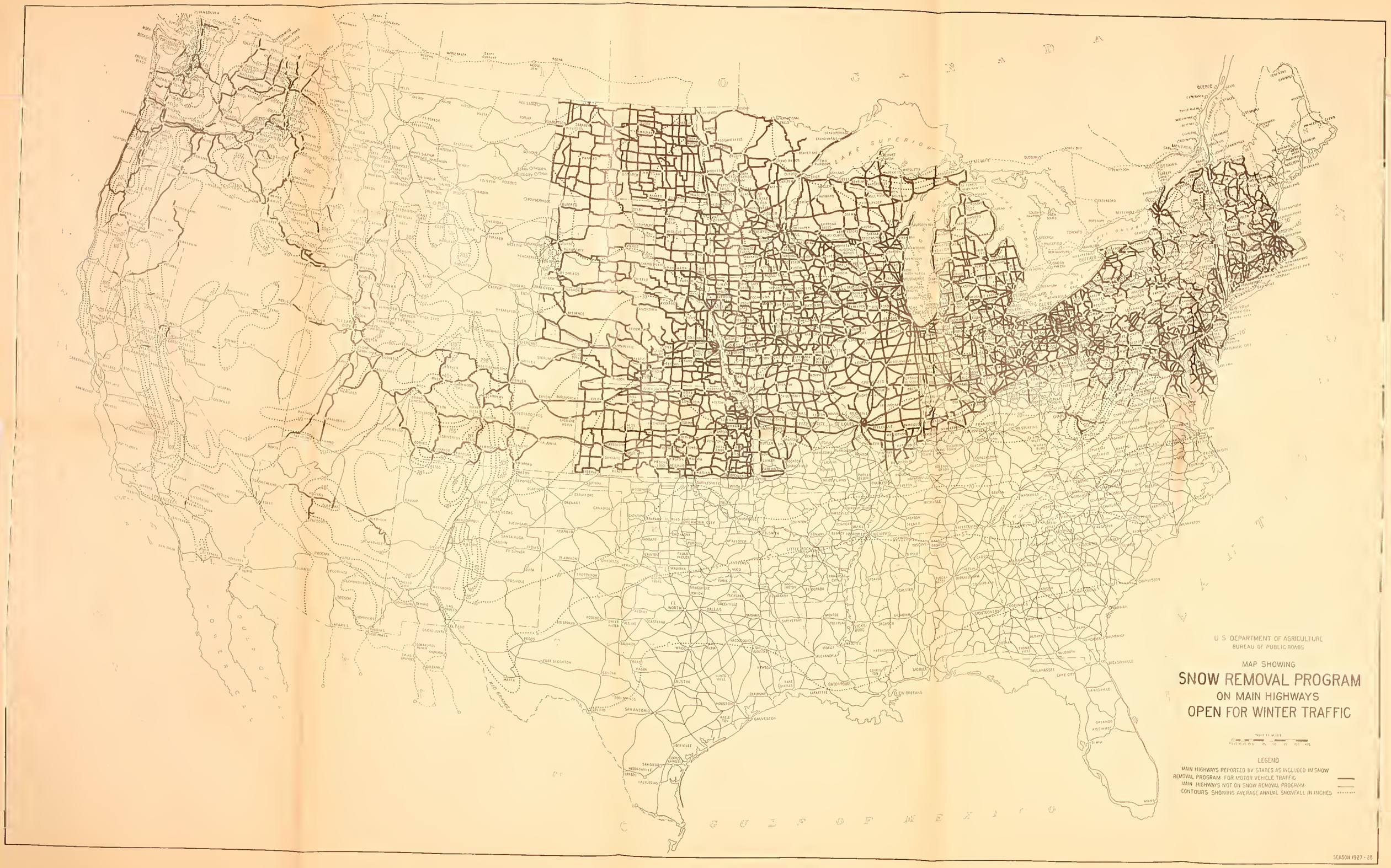
SNOW REMOVAL DATA - WINTER 1927-28

	STATE	Total mileage State roads (including Fed.-aid roads) surfaced with gravel or higher types of pavement as of Jan. 1, 1928	Min. and max. average annual snowfall recorded over a period of yrs. in different sections of State	Control of snow removal 1927-28	Snow Removal Equipment - Winter 1927-28: Truck plows: Displacement type	Truck plows: Rotary type	Tractor plows: Displacement type	Tractor plows: Rotary type	Miscellaneous equipment: Trucks and tractors	Miscellaneous equipment: Graders	Snow fence 1927-28	Snow Removal Winter 1927-28: Mileage of roads with snow removed	Average seasonal snowfall from records in different sections of State	Total cost snow removal	STATE	REMARKS
			Inches								Miles		Inches			
NORTH ATLANTIC STATES	Maine	1,491	74.4 to 131.9	State and townships	54	-	107	3	110 Tractors; 54 Trucks	4	12	3,125	87.4	$ 60,550	Maine	Data covers work done under snow removal act.
	New Hampshire	2,071	65.1 to 94.0	State and townships	42	-	146	2	42 Trucks; 148 Tractors	4	38	1,500	81.7	$ 65,933	New Hampshire	Data estimated from analysis of returns from 8 out of 10 engineering divisions
	Vermont	2,242	83.6 to 110.8	Townships	8	-	86	-	7 Trucks; 86 Tractors	15	-	1,692	88.8	38,014	Vermont	
	Massachusetts	1,565	45.4 to 81.8	State	178	-	20	-	175 Trucks; 20 Tractors	-	10	1,378	27.8	151,853	Massachusetts	Total cost included fiscal year ending July 1, 1928
	Rhode Island	479	24.1 to 47.0	State	73	-	1	9	73 Trucks; 10 Tractors	-	2	480	16.4	35,790	Rhode Island	
	Connecticut	1,851	40.3 to 78.8	State	275	-	-	-	202 Trucks; 7 Tractors	-	13	1,951	23.0	71,765	Connecticut	
	New York	10,204	28.8 to 141.4	Counties & townships	294	3	204	28	292 Trucks; 188 Tractors	36	661	8,656	69.4	540,010	New York	Data included both county and town work but for only 28 rural counties out of 57
	New Jersey	1,659	14.4 to 54.4	State and counties	170	-	5	4	170 Trucks; 6 Tractors	32	12	899	20.6	139,204	New Jersey	Data covers State work only
	Pennsylvania	8,827	24.7 to 92.2	State	595	-	96	21	595 Trucks; 116 Tractors	65	308	8,413	44.8	840,638	Pennsylvania	Additional equipment - 1 combination moldboard and rotary plow; 1 snow loader
S. ATLANTIC STATES	Delaware	629	18.7 to 22.9	State and counties	31	-	5	-	31 Trucks; 5 Tractors	-	3	600	17.1	9,766	Delaware	Snow removal data covers State work only. Additional $18,000 expended by counties.
	Maryland	2,818	13.9 to 69.4	State	89	-	-	3	89 Trucks; 3 Tractors	8	17	2,595	40.0	110,000	Maryland	
	Virginia	3,099	7.3 to 33.4	State and counties	40	-	15	-	75 Trucks; 50 Tractors	70	4	8,250	11.9	4,000	Virginia	Data included State work only
	West Virginia	2,210	8.2 to 101.0	State and counties	31	1	4	1	38 Trucks; 6 Tractors	31	-	962	51.0	7,439	West Virginia	Data covers State work only and but three State engineering divisions
NORTH CENTRAL STATES	Ohio	9,896	18.2 to 34.8	State and local	256	3	6	3	475 Trucks; 235 Tractors	321	49	8,247	16.6	132,216	Ohio	
	Indiana	4,349	13.6 to 81.3	State and local	41	-	2	-	808 Trucks; 118 Tractors	259	-	2,638	17.4	18,668	Indiana	Equipment included also many locally built plows. Data covers State work only
	Illinois	5,089	11.8 to 38.4	State	47	4	9	-	283 Trucks; 26 Tractors	100	4	2,583	13.1	184,198	Illinois	Total cost covers calendar year 1927
	Michigan	6,017	38.5 to 121.4	State and local	489	1	70	55	417 Trucks; 125 Tractors	-	261	6,683	82.0	871,116	Michigan	
	Wisconsin	8,600	24.9 to 78.3	Counties & townships	181	-	112	4	196 Trucks; 135 Tractors	59	554	17,496	53.4	492,998	Wisconsin	Data included work on county roads other than trunk highways for some localities
	Minnesota	8,265	24.0 to 54.4	State and local	112	-	49	12	177 Trucks; 91 Tractors	13	472	8,839	52.3	604,965	Minnesota	Additional 8,000 miles of local roads kept open at total cost of $800,000
	Iowa	4,442	21.2 to 36.1	State and counties	143	6	35	8	231 Trucks; 232 Tractors	213	898	7,091	20.1	285,914	Iowa	
	Missouri	3,913	8.7 to 34.2	State	10	-	6	-	66 Trucks; 40 Tractors	30	56	2,500	8.9	64,000	Missouri	Cost includes $49,000 expended on purchase of snow plows, snow fence, etc.
	North Dakota	1,728	25.0 to 46.2	State	1	-	5	3	2 Trucks; 8 Tractors	1	136	365	31.5	8,399	North Dakota	Snowfall light north half of State
	South Dakota	2,875	19.7 to 97.7	State and counties	32	-	24	7	60 Trucks; 50 Tractors	500	75	3,500	45.9	82,729	South Dakota	Work done by counties under State control with data estimated
	Nebraska	3,208	4.0 to 72.4	State	10	-	15	1	67 Trucks; 136 Tractors	212	307	3,428	17.3	63,887	Nebraska	Total cost includes purchase of snow fence and equipment
	Kansas	1,221	8.8 to 29.2	Counties	*	*	*	*	*	*	*	*	12.0	*	Kansas	
WESTERN STATES	Montana	1,075	18.5 to 270.9	State and counties	*	*	*	*	*	*	Extensive	*	68.8	*	Montana	No definite snow removal program undertaken
	Wyoming	1,033	9.2 to 219.7	State	2	-	3	-	10 Trucks; 10 Tractors	8	10	100	84.5	13,397	Wyoming	
	Colorado	3,671	12.8 to 276.8	State and counties	1	2	-	1	2 Tractors	2	No data	4,493	100.8	85,094	Colorado	Mileage - no total cost included State and county work; equipment State owned only
	New Mexico	1,793	5.3 to 136.4	State	10	2	10	-	276 Trucks; 180 Tractors	8	-	1,137	32.3	3,894	New Mexico	Mileage included duplication in some sections
	Arizona	1,466	0.4 to 83.0	State	-	-	3	-	7 Trucks; 3 Tractors	7	-	146	14.8	2,718	Arizona	Data covers one engineering division only
	Utah	1,388	5.0 to 155.1	State	36	-	18	1	36 Trucks; 17 Tractors	18	12	2,250	45.3	122,350	Utah	Cost for calendar year 1927 and includes $40,000 for purchase of equipment
	Nevada	1,309	0.8 to 87.0	State	1	1	1	3	18 Trucks; 10 Tractors	7	1	88	22.0	3,885	Nevada	Data reported covers work at mountain passes. No data available for other roads
	Idaho	2,105	1.0 to 207.0	State	11	2	8	6	36 Trucks; 18 Tractors	18	3	1,060	54.3	30,249	Idaho	Snowfall reported light for various sections of State
	Washington	2,670	3.8 to 252.3	State and counties	69	1	6	3	171 Trucks; 17 Tractors	27	4	2,293	64.2	82,994	Washington	Data covers State work only
	Oregon	3,410	1.4 to 338.8	State	50	3	16	8	53 Trucks; 21 Tractors	6	13	2,000	54.6	130,000	Oregon	
	California	3,689	1.0 to 783.0	State	6	-	8	2	11 Trucks; 14 Tractors	10	-	520	73.3	19,150	California	
	TOTAL	120,041			3,383	29	1,093	182	5,239 Trucks; 2,845 Tractors	2,078	3,634	111,646		$5,043,779		

* Asterisk indicates information not available. ** Double asterisk indicates data estimated.

Notes: The above data is compiled from reports by the States in answer to questionnaires submitted by the U. S. Bureau of Public Roads. Snowfall figures compiled from U. S. Weather Bureau records.

The number of displacement plows, rotaries, and other equipment listed, include those reported as under the control of various States and counties, but does not include those owned by numerous other counties of which we have no information, and also by townships, municipalities, transportation companies and divers business agencies.


U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
MAP SHOWING
SNOW REMOVAL PROGRAM
ON MAIN HIGHWAYS
OPEN FOR WINTER TRAFFIC
LEGEND
MAIN HIGHWAYS REPORTED BY STATES AS INCLUDED IN SNOW REMOVAL PROGRAM FOR MOTOR VEHICLE TRAFFIC
MAIN HIGHWAYS NOT ON SNOW REMOVAL PROGRAM
CONTOURS SHOWING AVERAGE ANNUAL SNOWFALL IN INCHES
LAKE SUPERIOR
GULF OF MEXICO
SEASON 1927-28

United States Department of Agriculture
Bureau of Public Roads

Current Condition of Federal Aid Road Work

As of September 30, 1928.

State	Balance of Federal Aid Available for New Projects	P. S. & E. Recommended for Approval						Project Agreements Executed									Paid to States During Fiscal Year	State
		Not Yet Under Construction			Under Construction			Not Yet Under Construction			Under Construction			Final Inspection Made				
		Federal Aid Allotted	Mileage Initial	Mileage Stage	Federal Aid Allotted	Mileage Initial	Mileage Stage	Federal Aid Allotted	Mileage Initial	Mileage Stage	Federal Aid Allotted	Mileage Initial	Mileage Stage	Federal Aid Allotted	Mileage Initial	Mileage Stage		
Alabama	$ 1,366,041.83	$ 67,423.28		6.8	$ 330,210.05	69.6		$			$ 2,307,063.93	264.9	37.9	$ 1,690,438.67	168.7	24.8	$ 656,553.75	Alabama
Arizona	2,705,368.01	66,068.70		11.7	36,353.76	2.4	1.8				1,110,762.16	59.0	.8	884,759.42	69.4	6.8	507,681.47	Arizona
Arkansas	1,745,940.42	6,255.72		.3	208,606.09	21.4	6.3				1,944,194.54	148.1		348,100.68	62.3		336,029.20	Arkansas
California	2,491,946.69	86,672.26	13.4		603,016.99	32.9		208,073.24	11.6		2,843,167.35	129.0	8.7	696,827.83	39.8	.6	603,929.80	California
Colorado	2,051,102.16	177,130.04	11.8		547,764.71	23.1	1.8	54,471.34	8.4		2,182,696.91	169.9	23.6	621,736.16	45.7		503,250.05	Colorado
Connecticut	566,752.61							39,975.00	2.7		607,411.53	34.2		769,896.08	23.8		203,922.09	Connecticut
Delaware	164,677.22	40,800.00	2.7								178,886.54	13.0	2.1	21,064.29		1.9	48,288.94	Delaware
Florida	1,212,661.02	269,730.00	18.0								1,418,070.87	94.6	6.5	288,552.60	12.0		393,468.44	Florida
Georgia	13,908.38	171,406.83	19.9	4.6	179,485.47	4.0	20.6	186,429.74	19.0	3.8	2,456,950.88	237.2	41.8	131,376.16	24.7	9.1	521,557.77	Georgia
Idaho	78,136.97	61,295.94	11.4		150,213.38	19.1	7.8	42,618.65	6.2		1,356,097.17	140.7	48.8	230,680.48	34.0		527,786.50	Idaho
Illinois	11,540.17	684,381.99	46.6		2,084,096.87	154.5					7,921,568.92	631.1		1,128,566.52	77.8		1,877,154.96	Illinois
Indiana	167,949.39	372,510.00	24.4		162,000.00	11.4					4,284,660.07	270.6	3.6	1,767,236.30	122.9		816,084.97	Indiana
Iowa	171,313.77							231,211.62	3.7	36.0	2,700,754.89	92.7	160.2	908,898.68	50.4	20.6	154,284.55	Iowa
Kansas	215,300.62	976,721.80	174.2	4.3	304,080.57	44.6	12.0	67,267.17	13.4		1,819,879.96	242.9		1,970,611.96	229.1	.4	698,063.50	Kansas
Kentucky	223,665.30	636,198.82	71.6		520,377.03	47.1					2,001,336.07	178.1		1,031,366.06	78.2	16.6	318,145.40	Kentucky
Louisiana	185,133.73	25,000.00	.1		367,238.15	5.4					2,067,207.29	192.9		129,913.41	7.9		292,332.09	Louisiana
Maine	896,907.45	208,659.43	16.4		270,144.62	19.5		127,206.00	11.1		444,699.96	29.7		288,436.11	22.8			Maine
Maryland	39,571.23				181,945.00	12.2					608,830.00	58.1	7.2				219,456.41	Maryland
Massachusetts	1,609,439.75	66,750.00	4.4		523,867.19	30.7					860,608.05	63.8		534,246.30	31.4		447,873.90	Massachusetts
Michigan	276,181.95	394,680.00	21.2	6.5	848,607.00	53.7					4,985,036.08	304.1		516,340.72	30.8		1,232,976.07	Michigan
Minnesota	192,755.21				285,716.22	16.8	19.8	118,000.00	6.8		1,788,600.00	261.0	71.6	250,600.00	37.1	19.0	1,390,556.09	Minnesota
Mississippi	565,056.46	13,972.61	3.3		566,586.77	29.1	.7				1,658,982.16	155.3	30.9	762,121.07	101.2	9.0	350,721.53	Mississippi
Missouri	838,511.86	442,061.40	28.8	3.9	788,990.11	59.0	17.2	34,280.00	2.3		1,763,783.14	115.4	40.9	641,499.12	63.1	9.6	712,056.29	Missouri
Montana	4,090,763.15				250,183.51	25.4		416,568.56	81.7	4.1	1,949,329.32	258.9	13.4	1,703,844.12	219.4	3.2	678,667.56	Montana
Nebraska	1,828,529.96	151,505.06	14.9	18.8	57,927.05		.2	34,800.74		23.1	2,332,349.12	461.8	101.1	1,654,718.90	350.6	136.9	460,489.91	Nebraska
Nevada	346,408.95	158,984.83	20.3	27.8	107,356.76	.4	14.1				721,785.68	96.7	26.3	635,443.02	74.7	68.5	286,854.56	Nevada
New Hampshire	19,527.50				62,298.26	5.6		24,135.00	1.8		265,499.26	18.9		288,886.32	17.2		12,778.96	New Hampshire
New Jersey	86,765.94	124,005.00	8.3		507,106.00	33.8					347,097.35	26.1		284,610.00	19.0		172,670.23	New Jersey
New Mexico	480,350.59	187,387.31	10.4		238,435.90	31.5		6,480.35	.3		1,788,472.03	175.8	.6	1,719,984.17	139.1		438,913.74	New Mexico
New York	3,451,909.55	112,200.00	7.5					1,197,105.00	79.9		7,354,627.50	481.2	8.5	967,907.50	49.2		787,456.39	New York
North Carolina	614,095.71	276,073.30	25.8	7.2	530,675.01	23.0	12.4				616,139.02	70.4	13.0	510,258.43	24.5		275,909.74	North Carolina
North Dakota	349,698.92	181,710.94	69.6	41.6	164,999.62	25.7	47.8	126,777.31	56.7	38.0	1,304,676.65	529.3	122.5	1,038,950.63	301.4	160.0	447,674.54	North Dakota
Ohio	1,554,811.86	1,059,870.00	50.0	9.8	932,395.00	67.9	.1	35,476.04		2.9	4,099,283.86	241.1	6.9	1,076,962.28	79.7		1,128,050.43	Ohio
Oklahoma	193,632.76	408,499.79	50.7	12.4	543,050.20	44.5	14.3				1,317,309.91	136.0		1,035,772.49	188.9	12.8	493,240.90	Oklahoma
Oregon	1,231,794.83	7,694.53	1.0		31,050.54			99,154.80	13.1		652,002.03	28.8		404,196.03	27.3	9.2	79,451.71	Oregon
Pennsylvania	898,893.00	467,483.34	29.6		281,820.92	18.3		111,496.98	6.6		4,025,039.50	247.3		2,252,542.87	136.6		685,968.96	Pennsylvania
Rhode Island	583,494.49							43,974.55	1.6		234,446.26	14.7		66,585.00	4.4		240,602.30	Rhode Island
South Carolina	54,386.59				146,000.00	1.3	23.3				1,657,073.44	189.3	100.0	797,233.84	93.4	46.6	368,737.82	South Carolina
South Dakota	252,177.06	48,669.67	21.0	3.0	37,283.67	.3	19.5	139,537.37	86.8	12.3	1,703,880.02	619.1	71.7	742,218.54	212.1	75.7	633,758.50	South Dakota
Tennessee	305,447.33	240,378.31	6.6	18.7	1,752,678.60	64.5	49.6	271,521.87		26.0	1,002,310.88	86.0		1,568,527.06	104.6	23.8	160,114.05	Tennessee
Texas	2,450,944.45	2,294,224.38	284.9	111.3	1,738,703.67	55.1	42.3	249,945.72	59.8	1.6	2,614,168.28	184.6	148.9	2,258,138.79	208.1	77.3	949,507.36	Texas
Utah	41,148.02	268,471.09	28.8	8.9	83,234.64	3.6	4.0	53,906.37	10.3	1.0	1,079,433.37	83.9	6.3	689,782.39	49.6	6.6	284,806.88	Utah
Vermont	42,653.83	16,725.00	1.1					55,000.00	8.3		384,026.29	23.6		259,501.44	17.7		87,138.67	Vermont
Virginia	11,604.44	150,612.74	19.7		134,982.21	12.6		17,809.82	13.9		1,295,864.66	102.8	21.6	516,318.20	32.8		306,693.82	Virginia
Washington	445,548.83	119,600.00	11.1		65,800.00	6.6		330,166.27	11.8	6.0	1,100,975.25	73.2	18.1	406,600.00	47.4			Washington
West Virginia	248,905.80	237,670.68	13.3	9.9	170,937.36	14.6	2.5	71,027.58	2.4		861,174.28	70.8		1,120,462.88	109.6	4.0	374,959.87	West Virginia
Wisconsin	1,359,870.96	213,640.00	14.8		451,131.51	42.3	17.0				2,275,830.78	191.3	16.6	1,366,777.55	97.0	16.6	42,749.89	Wisconsin
Wyoming	7,971.18	19,260.00	9.4		74,079.18	12.2					1,235,802.09	206.4	.6	342,557.42	54.1	31.6	606,278.26	Wyoming
Hawaii	1,068,498.69							67,501.20	1.8					60,383.43	3.2		42,847.39	Hawaii
TOTALS	39,870,696.46	11,410,184.78	1,156.6	304.3	17,450,225.54	1,134.6	334.7	4,440,878.17	615.7	152.8	91,298,521.24	8,292.2	1,164.2	39,160,516.66	4,004.5	781.8	22,463,711.11	TOTALS

CAPPING SPECIMENS FOR COMPRESSION TESTS OF CONCRETE

CONTRIBUTED BY F. H. JACKSON OF THE DIVISION OF TESTS
(NOT FOR RELEASE)

A RECENT INSPECTION OF A NUMBER OF CONCRETE TESTING LABORATORIES BY THE WRITER HAS INDICATED THAT THE METHOD OF CAPPING SPECIMENS FOR COMPRESSION TESTS IS NOT SO WELL STANDARDIZED AS IS DESIRABLE.

NUMEROUS TESTS, MADE IN THE LABORATORY OF THE PORTLAND CEMENT ASSOCIATION FOR THE PURPOSE OF DETERMINING THE EFFECT OF END CONDITION OF CYLINDERS UPON THE RESULTS OF COMPRESSION TESTS, INDICATE THAT NOT ONLY THE SMOOTHNESS OF THE CAP BUT THE CHARACTER OF THE CAPPING MATERIAL HAS QUITE AN INFLUENCE UPON THE RESULTS OBTAINED.

THESE STUDIES HAVE BEEN PUBLISHED AS BULLETIN 14, OF THE STRUCTURAL MATERIALS RESEARCH LABORATORY, ENTITLED, "EFFECT OF END CONDITION OF CYLINDER ON COMPRESSIVE STRENGTH OF CONCRETE", AND COPIES OF THIS PUBLICATION MAY BE OBTAINED FROM THE PORTLAND CEMENT ASSOCIATION, 33 WEST GRAND AVENUE, CHICAGO. AMONG THE CONCLUSIONS BEARING ON THIS PARTICULAR PHASE OF THE SUBJECT, THERE MAY BE MENTIONED THE FOLLOWING:

WHEN TESTED WITHOUT BEDDING, THE STRENGTHS OBTAINED VARIED FROM ABOUT 80 TO 95 PER CENT OF THE STANDARD METHOD, DEPENDING UPON THE RICHNESS OF THE CONCRETE. WITH ALL TYPES OF SHEET MATERIALS BETWEEN THE TOP OF THE CYLINDER AND THE SPHERICAL BEARING BLOCK, THE STRENGTHS WERE LESS IN ALL CASES THAN FOR THE STANDARD METHOD OF CAPPING.

1.- FOR BEAVER BOARD THE STRENGTHS OBTAINED VARIED FROM ABOUT 90 TO 100 PER CENT OF THE STANDARD METHOD, DEPENDING UPON THE RICHNESS OF THE CONCRETE.

2.- FOR WHITE PINE BOARD, MILL BOARD AND LEATHER, THE STRENGTHS WERE LESS THAN FOR BEAVER BOARD.

3.- FOR OTHER SHEET MATERIALS, SUCH AS BLOTTING PAPER, SHEET LEAD, AND RUBBER, THE STRENGTHS WERE LESS THAN WHERE NO BEDDING AT ALL WAS USED.

THIS MATTER IS CALLED PARTICULARLY TO THE ATTENTION OF THE MATERIALS ENGINEERS, DUE TO THE FACT THAT CERTAIN LABORATORIES ARE STILL USING BLOTTING PAPER, BEAVER BOARD, AND OTHER SHEET MATERIALS OF A SIMILAR NATURE FOR CAPPING SPECIMENS IN LIEU OF THE STANDARD METHOD AS OUTLINED IN A.S.T.M. STANDARD METHOD OF TEST C 39-27, WHICH REQUIRES A NEAT CEMENT CAP.

THE TESTS ABOVE REFERRED TO, HOWEVER, INDICATE THAT PLASTER OF PARIS OR MIXTURES OF PLASTER OF PARIS AND CEMENT GAVE ESSENTIALLY THE SAME RESULTS AS THE STANDARD METHOD OF CAPPING. THE BUREAU ACCORDINGLY WOULD APPROVE EITHER CEMENT OR PLASTER CAPS OR A COMBINATION THEREOF BUT WOULD NOT CONSIDER AS GOOD PRACTICE THE USE OF ANY SHEET MATERIAL SUCH AS CARDBOARD OR BLOTTING PAPER.

GRADER CUTTING EDGES STANDARDIZED BY THE MISSISSIPPI VALLEY STATE HIGHWAY ASSOCIATION

COMPILED FROM A REPORT SUBMITTED BY G. L. CAMPEN OF DISTRICT 5

STANDARD SPECIFICATIONS FOR CUTTING EDGES OF BLADE GRADERS WERE ADOPTED BY THE MISSISSIPPI VALLEY STATE HIGHWAY ASSOCIATION AT A MEETING OF THE COMMITTEE ON THE STANDARDIZATION OF CUTTING EDGES, HELD IN THE MAYFAIR HOTEL IN ST. LOUIS, MO., ON SEPTEMBER 4, 1928. THERE WERE PRESENT AT THIS MEETING THE CHAIRMAN - W. H. ROOT, ENGINEER OF MAINTENANCE OF THE IOWA STATE HIGHWAY COMMISSION - W. F. ROSENWALD, ENGINEER OF MAINTENANCE OF THE MINNESOTA DEPARTMENT OF HIGHWAYS; C. P. OWENS, ENGINEER OF MAINTENANCE OF THE MISSOURI STATE HIGHWAY COMMISSION; GEORGE L. CAMPEN, OF THE BUREAU; N. M. KEISER OF THE AUSTIN WESTERN MANUFACTURING COMPANY, CHICAGO, ILL.; J. A. HANRATTY OF THE RUSSEL GRADER MANUFACTURING COMPANY, MINNEAPOLIS, MINN.; U. G. SMITH OF THE GALLION MANUFACTURING COMPANY, GALLION, OHIO; W. R. ADAMS OF THE ADAMS GRADER COMPANY OF INDIANAPOLIS, IND.; O. W. SCHMIDT OF THE CASWELL GRADER COMPANY OF KANSAS CITY, MO.; AND W. N. PATTON OF THE EMPIRE PLOW WORKS OF CLEVELAND, OHIO.

AT THE REQUEST OF THE CHAIRMAN, MR. ROSENWALD EXPLAINED THAT THE MEETING WAS CALLED FOR THE PURPOSE OF ADOPTING UNIFORM STANDARDS FOR THE CUTTING EDGES OF ROAD GRADERS. THE SPEAKER STATED THAT THE VARIOUS STATES WITHIN THE ASSOCIATION FOUND IT BURDENSOME TO CARRY A LARGE STOCK OF CUTTING EDGES SIMPLY BECAUSE THE BLADES WERE NOT MADE INTERCHANGEABLE FOR THE VARIOUS MAKES OF MACHINES. HE PROPOSED A STANDARD SIZE AND SPACING OF BOTH THE MOLD BOARDS AND THE CUTTING EDGES SO THAT A 6, 8, 10, OR 12-FOOT BLADE WOULD FIT ANY OF THE CORRESPONDING SIZES OF MOLD BOARDS MANUFACTURED BY THE VARIOUS COMPANIES. IN RESPONSE TO THEIR QUESTION AS TO WHETHER THIS STANDARDIZATION WOULD BE MADE TO INCLUDE THE BLADES AND MACHINES USED BY COUNTIES AND LOCAL AUTHORITIES, THE MANUFACURERS WERE INFORMED THAT THE RECOMMENDATIONS OF THE COMMITTEE WERE INTENDED TO APPLY ONLY TO EQUIPMENT PURCHASED BY THE STATE HIGHWAY DEPARTMENTS IN THE MISSISSIPPI VALLEY STATE HIGHWAY ASSOCIATION. MR. ROOT INTERPOSED, HOWEVER, THAT PROVIDED THE MANUFACTURERS IN ATTENDANCE EXPRESSED THEIR APPROVAL OF THE PROPOSAL, THE MATTER WOULD BE SUBMITTED AT AN EARLY

DATE TO THE EXECUTIVE COMMITTEE OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS THROUGH MR. F. R. WHITE OF IOWA AND MR. C. M. BABCOCK OF MINNESOTA, BOTH MEMBERS OF THE COMMITTEE. MR. ROOT EXPRESSED THE BELIEF THAT THE A.A.S.H.O. COMMITTEE TO WHICH THE PROPOSAL WOULD BE REFERRED WOULD BE FAVORABLE TO BRINGING THE SUBJECT BEFORE THE ENTIRE MEMBERSHIP OF THE ASSOCIATION BUT HE EXPLAINED THAT IT WOULD BE NECESSARY FOR THE STATE HIGHWAY DEPARTMENTS TO SIGNIFY THEIR ACCEPTANCE BY LETTER BALLOT BEFORE THE PROPOSAL COULD BE FORMALLY ADOPTED.

AFTER SOME DISCUSSION BY THE MANUFACTURERS, WHICH BROUGHT OUT THE NEED FOR SLIGHT CHANGES IN THE PLAN SHOWING THE PUNCHING OF THE MOLD BOARD AND CUTTING EDGES, AS SUBMITTED BY MR. ROSENWALD, THE MANUFACTURERS AGREED TO COMPLY WITH THE REQUIREMENTS SET FORTH BY THE COMMITTEE. SHOULD THE PROPOSAL BE ADOPTED BY THE MEMBERS OF THE A.A.S.H.O., THE MANUFACTURERS AGREED TO STAMP EACH CUTTING EDGE WITH THE LETTERS "S.H." INDICATING THAT THE BLADE SO MARKED WAS INTENDED TO BE USED BY A STATE HIGHWAY DEPARTMENT.

MR. C. P. OWENS OF MISSOURI, WHO ACTED AS SECRETARY OF THE COMMITTEE, IS TO PREPARE A FULL REPORT OF THE MEETING.